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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:

Koji YAMADA et al.

Art Unit: 1793

Application No.: 10/521,818

Examiner: Yang, J.

Filed: January 21, 2005

Attorney Dkt. No.: 12065-0020

For: METHOD AND APPARATUS FOR RECOVERING PLATINUM GROUP ELEMENTS (AS AMENDED)

**REQUEST FOR RECONSIDERATION**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

Applicants respectfully request reconsideration of the rejection of the claims.

In review, claim 1 requires the following steps.

charging into a closed electric furnace and melting, together with flux components and a reducing agent, a platinum group element-containing substance to be processed and a copper source material containing copper oxide;

sinking molten metal of primarily metallic copper below a molten slag layer of primarily oxides; and

enriching the platinum group elements in the molten metal sunk below, which method for recovering platinum group elements is characterized in

that;

the copper source material charged into the electric furnace is composed of granules of an average grain diameter of not less than 0.1 mm and not greater than 10 mm;

a copper content of molten slag in the furnace is ascertained by sampling and analyzing; and

molten slag is discharged from the electric furnace when a copper content of the molten slag has been ascertained to be 3.0 wt.% or less.

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Important to note here is that the process entails the recovery of platinum group metals (PGMs) by monitoring the Cu content in the slag and removing the slag once the Cu content reaches a predetermined level.

In rejecting this claim, the Examiner cites US '305 for teaching the claimed process but for the monitoring of the slag and slag removal. To make up for this deficiency, the Examiner cites JP '322 to allege that the step of "a copper content of molten slag in the furnace is ascertained by sampling and analyzing; and molten slag is discharged from the electric furnace when a copper content of the molten slag has been ascertained to be 3.0 wt.% or less" is taught and it would be obvious to employ this step in the method of US '305.

Applicants contend that the Examiner has misinterpreted the teachings of the prior art and this misinterpretation is an error that makes the rejection unsustainable.

In the rejection, the Examiner takes the following position:

JP '322 teaches the relationship between copper content of the molten slag and the recovery rate of Pt, and US '302 teaches the analysis of the original concentrate, roasted concentrate and slag, and the similar PGMs recovering process using the similar electric furnace as recited in the instant invention. Therefore, it would have been obvious to one skilled in the art to apply the slag analysis and monitoring process of US '302 in the process of US '305 in view of JP '322, because US '302 teaches high recovery of the precious metals (99.9%) could be obtained. (emphasis added)

More particularly, the Examiner misunderstands the difference between the copper content of the molten oxides obtained from an oxidizing furnace 1 for the copper content of the molten slag obtained from the electric furnace 3 in JP '322. The Examiner's attention is directed to the Supplemental Response filed on October 8, 2008 for the processing of JP '322 and the use of a reducing operation using the electric

furnace 3 and an oxidizing operation using an oxidizing furnace 1. Particular reference is made to the attachments of the Supplemental Response where the processing of JP '322 is explained.

In JP '322, the only description of a molten slag is found in paragraph [0034], which is translated as follows:

[ ] [Example 2] The molten oxides (See D in Table 1 of the sheets, having copper content of 82.5%) obtained in Example 1 were melted and reduced in Electric furnace 3 as shown in Fig. 1. Using silica stone and lime as a flux and coke as a reducing agent, the molten oxides were reduced at a temperature of 1500 degrees C. Reduced copper obtained was separated from the slag and charged into oxidizing furnace , oxidizing treatment as the same as Example 1 was carried out upon charging a metal base catalyst (spent catalyst) as the same, The samples sampled from the molten metal and molten oxides obtainer were analyzed and examined the material-transfers and balances. The results were shown in Table 2.

From this, it is clear that the molten oxides (D) obtained from the oxidizing furnace 1 and the slag (F) obtained from the electric furnace 3 cannot be recognized as being the same or a similar material. This is because the molten oxides are obtained by an oxidizing treatment, i.e., oxygen blowing, and the slag is obtained by a reduction process using coke. In pyrometallurgy, since oxidizing is completely different from reducing in a metallurgical reaction, it is factual error to say that the slag (F) produced through reduction using the electric furnace 3 is the same as the oxides (D) produced by oxygen blowing in oxidizing furnace 1.

The contention that it is error to equate the oxidized copper to the slag produced by reduction is supported by JP '322 itself. The oxides obtained by oxidizing a molten copper contains copper of 81.5%, see D of Table 2. Based on this percentage, it can

be seen that the oxides comprises almost all copper oxide and this means that the copper oxide is the desired end product of the oxidizing step. This desired end product cannot be considered to be a "slag", which is a residue, not a desired product of an operation. The "slag" obtained by the reducing process of the electric furnace 3 of JP '322 contains no copper after the copper oxide is reduced to form the copper, which is the starting material for the PGM recovery process. The copper obtained as part of the reducing process drop into the lower metal pool apart from the slag. The slag, if it contains any copper, would only contain a small percentage of copper as would be readily understood by one of skill in the art since the desired product is the reduced copper, not the slag.

There is absolutely no clue in JP '322 about how to know the content of the PGM in the slag produced as part of the reducing process. Without any teaching of knowing the content of the slag of the reducing process, how is it that the step of sampling and analyzing the copper content of molten slag in the furnace and discharging the molten slag from the electric furnace when a copper content of the molten slag has been ascertained to be 3.0 wt.% can be ascertained from JP '322? In fact, the slag does not come into play in recovery of the PGM as it does in the present invention and JP '322 does not supply the missing element from the primary reference.

For ascertaining the PGM content in the slag during the operation, the present inventors have discovered that the Cu content of the slag is the marker for ascertaining PGM content. As stated in the claims, when the copper content is decreased up to the level of 3% in the slag, PGM therein is deemed to be negligible and it is now timely to

discharge the molten slag. This concept is nowhere to be found in JP '322 from the data of the copper content in the oxides of the oxidizing furnace 1 of JP '322. The copper content will just continue to increase the more the oxidizing continues.

As part of the rejection, the Examiner also notes:

Regarding the limitation of discharging the molten slag with Cu 3.0 wt.% or less in the discharge step of the instant claim 1, copper content in the slag is a result effective variable in terms of platinum group metal recovery rate as evidenced by JP '322. This point is further evidenced by US '302. US '302 teaches the Cu in the slag is 5.55g in 1571g (0.36%) in order to obtain a vast majority of 99.0% PGMs. US '302 further teaches copper-nickel alloy containing the vast majority in the precious metals. Therefore, it would have been obvious to one skilled in the art to have optimized the Cu in slag in order to obtain a desired recovery for the precious metals.

However, the 5.55g (0.36%) of the copper content in the slag in US '302 is one that is obtained in a crucible test using a dead roasted furnace matte containing copper of 10.7 wt.% and Ni of 18.1 wt%. Such a dead roasted Ni-Cu matte is not the case for recovering PGM from a waste catalyst using molten Cu as a kind of solvent for taking up the PGM, wherein the solvent must be fed from an outsource. How to separate PGM from dead-roasted matter derived from Cu-Ni matter inherently accompanying PGM is one of a concentration technique in refining metallurgy for Ni-containing sulfide ores. It is not proper to regard this refining as similar in nature to a method of recovering PGM from the waste catalyst, because the waste catalyst usually includes no copper or nickel. In instant claim 1, it is essential to charge the furnace with a copper source material containing copper oxide separately from charging the waste catalyst.

In addition, the datum, 5.55g (0.36%) of copper content together with 11.7g (0.77%) of nickel content in the slag of US '302 is one point. How can it be that the relationship shown in Figure 2 of the present application is derived from one point of data? The Examiner is engaging in unsupported speculation to conclude that the invention is obvious based on one point of data. Since the rejection must be based on objective factual evidence and none exists, it must be withdrawn.

It is also error to consider the discharge of the slag of JP '322 as a result of an effective variable and allege that the 3% target could be obtained as a result of optimization. There is absolutely no link between the copper content of the slag of JP '322 and the slag discharge. Without this link or recognition, how is it that the artisan knows to optimize the discharge point of the slag based on copper content? It is just not possible given the failings of JP '322 and the rejection with respect to the 3% copper content as a slag discharge trigger is also improper.

To summarize based on the arguments made above, it is submitted that the prior art relied upon by the Examiner does not establish a *prima facie* case of obviousness against any of claims 1, 3, and 4. The Examiner has misinterpreted the prior art teachings and this misinterpretation fatally taints the rejection and requires its withdrawal. Therefore, the claims before the Examiner are now in condition for allowance.

Accordingly, the Examiner is requested to examine this application in light of this Amendment and pass all pending claims onto issuance.

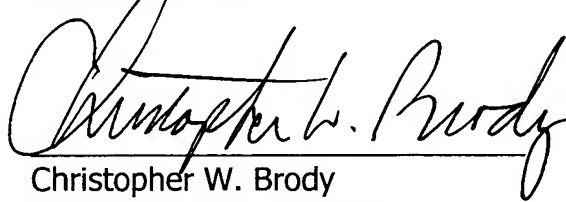
If the Examiner believes that an interview would be helpful in expediting the allowance of this application, the Examiner is requested to telephone the undersigned at 202-835-1753.

The above constitutes a complete response to all issues raised in the Office Action dated December 22, 2008.

Again, reconsideration and allowance of this application is respectfully requested.

Applicants petition for a one month extension of time and a check in the amount of \$130.00 is attached. Please charge any fee deficiency or credit any overpayment to Deposit Account No. 50-1088.

Respectfully submitted,  
CLARK & BRODY

A handwritten signature in black ink, appearing to read "Christopher W. Brody", is written over a horizontal line.

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Docket No.: 12065-0020  
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